

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY  
540 S. MORRIS AVE., MONTGOMERY, AL 36115  
ALPBET ANALYSES**

**REPORT OF SAMPLE DELIVERY GROUP #1100248**

Project: Dimock Residential GW Site, Dimock, PA  
Analysis method: Gross Alpha and Beta on Water Samples  
Report ID: 1100248-ALPBET  
Report type: Original  
Date reported: 03/05/2012  
Total pages in report: 334

**SAMPLES**

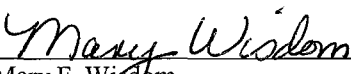
NAREL Sample #	Client Sample ID	Location	Matrix	Date Collected	Date Received
B2.01731G	HW49	PA:DIMOCK	WATER-DRINKING	02/09/2012	02/13/2012
B2.01732H	FB14	PA:DIMOCK	WATER-DRINKING	02/09/2012	02/13/2012
B2.01733J	HW21Z	PA:DIMOCK	WATER-DRINKING	02/09/2012	02/13/2012
B2.01734K	HW22	PA:DIMOCK	WATER-DRINKING	02/09/2012	02/13/2012
B2.01735L	HW44	PA:DIMOCK	WATER-DRINKING	02/09/2012	02/13/2012
B2.01736M	HW36N	PA:DIMOCK	WATER-DRINKING	02/10/2012	02/13/2012
B2.01737N	HW54	PA:DIMOCK	WATER-DRINKING	02/10/2012	02/13/2012
B2.01761N	HW55	PA:DIMOCK	WATER-DRINKING	02/13/2012	02/14/2012
B2.01762P	FB16	PA:DIMOCK	WATER-DRINKING	02/13/2012	02/14/2012
B2.01763Q	HW27	PA:DIMOCK	WATER-DRINKING	02/13/2012	02/14/2012
B2.01777X	FB17	PA:DIMOCK	WATER-DRINKING	02/14/2012	02/15/2012
B2.01778Y	HW57	PA:DIMOCK	WATER-DRINKING	02/14/2012	02/15/2012
B2.01779Z	HW03	PA:DIMOCK	WATER-DRINKING	02/14/2012	02/15/2012
B2.01780R	HW03Z	PA:DIMOCK	WATER-DRINKING	02/14/2012	02/15/2012
B2.01781T	HW58	PA:DIMOCK	WATER-DRINKING	02/14/2012	02/15/2012
B2.01782U	HW11	PA:DIMOCK	WATER-DRINKING	02/13/2012	02/15/2012
B2.01783V	HW27Z	PA:DIMOCK	WATER-DRINKING	02/13/2012	02/15/2012
B2.01784W	HW53	PA:DIMOCK	WATER-DRINKING	02/13/2012	02/15/2012
B2.01785X	HW59	PA:DIMOCK	WATER-DRINKING	02/14/2012	02/15/2012
B2.01877A	HW07	PA:DIMOCK	WATER-DRINKING	02/15/2012	02/16/2012

**EXCEPTIONS**

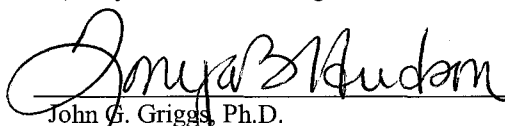
- Packaging and shipping**—No problems were observed.
- Documentation**— NAREL originally agreed to analyze 71 samples for this project, but sample collectors collected and shipped more samples than expected. NAREL then agreed to analyze 100 samples, which would make five batches of 20 for QC purposes. Actually 101 samples were received. With the client's permission, NAREL did not analyze the field blank received in the last shipment thus making the agreed upon total of 100 samples for analysis.
- Sample preparation**—No problems were encountered.
- Analysis**— No problems were encountered.
- Holding times**—No holding times were specified.

## CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Director of the Center for Environmental Radioanalytical Laboratory Science and the NAREL Quality Assurance Manager, or their designees, as verified by the following signatures.

  
\_\_\_\_\_  
Mary F. Wisdom  
Quality Assurance Manager, NAREL

3-8-12  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
John G. Griggs, Ph.D.  
Director, Center for Environmental Radioanalytical  
Laboratory Science

3/14/12  
\_\_\_\_\_  
Date

## GENERAL INFORMATION

### SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

### ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Method blank

### QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

### EVALUATION OF QC ANALYSES

A method blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

## GENERAL INFORMATION (CONTINUED)

### GROSS ALPHA AND BETA ANALYSIS

In comparison to the methods employed to determine radionuclide-specific activities, the method employed by NAREL to determine gross alpha and beta activity in water samples has the potential for greater analytical bias. It should be noted that this potential analytical uncertainty is not included in the two-sigma counting uncertainty term. Therefore, gross alpha and beta results should be used as gross approximations of the alpha and beta activity present.

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
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**SDG #1100248**

**ANALYSIS SUMMARY**

Analysis Procedure: NAREL GR-01  
Title: Gross Alpha and Beta on Water Samples

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Assay Batch #	QC Batch #
B2.01731G	DUP	N/A	02/27/2012	0015744N	0008496P
B2.01732H		N/A	02/27/2012	0015744N	0008496P
B2.01733J		N/A	02/27/2012	0015744N	0008496P
B2.01734K		N/A	02/27/2012	0015744N	0008496P
B2.01734K		N/A	02/28/2012	0015744N	0008496P
B2.01735L		N/A	02/28/2012	0015744N	0008496P
B2.01736M		N/A	02/28/2012	0015744N	0008496P
B2.01737N		N/A	02/28/2012	0015744N	0008496P
B2.01761N		N/A	02/28/2012	0015744N	0008496P
B2.01762P		N/A	02/28/2012	0015744N	0008496P
B2.01762P	MS	N/A	02/28/2012	0015744N	0008496P
B2.01763Q		N/A	02/28/2012	0015744N	0008496P
B2.01777X		N/A	02/28/2012	0015744N	0008496P
B2.01778Y		N/A	02/28/2012	0015744N	0008496P
B2.01779Z		N/A	02/28/2012	0015744N	0008496P
B2.01780R		N/A	02/28/2012	0015744N	0008496P
B2.01781T		N/A	02/28/2012	0015744N	0008496P
B2.01782U		N/A	02/28/2012	0015744N	0008496P
B2.01783V		N/A	02/28/2012	0015744N	0008496P
B2.01784W		N/A	02/28/2012	0015744N	0008496P
B2.01785X	LCS	N/A	02/28/2012	0015744N	0008496P
B2.01877A		N/A	02/28/2012	0015744N	0008496P
LCS-00631919B *		N/A	02/28/2012	0015744N	0008496P
RBK-00631920U *	RBK	N/A	02/28/2012	0015744N	0008496P

\* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**PREPARATION METHOD(S) USED**

Procedure ID	Title

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01731G	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/27/2012 16:11	100.0	GQ2A	GVJ

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	2.12e+00	1.9e+00	1.4e+00	PCI/L	02/27/2012 16:11 CST
Beta	2.56e+00	1.3e+00	1.9e+00	PCI/L	02/27/2012 16:11 CST

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**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01732H	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/27/2012 16:11	100.0	GQ2B	GVJ

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	2.10e-01	9.2e-01	7.7e-01	PCI/L	02/27/2012 16:11 CST
Beta	-3.87e-01	1.0e+00	1.7e+00	PCI/L	02/27/2012 16:11 CST

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**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01733J	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/27/2012 16:11	100.0	GQ2C	GVJ

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	3.87e-01	1.5e+00	1.3e+00	PCI/L	02/27/2012 16:11 CST
Beta	9.72e-01	1.2e+00	1.8e+00	PCI/L	02/27/2012 16:11 CST



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**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01734K	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/27/2012 16:11	100.0	GQ2D	GVJ

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	6.06e+00	4.4e+00	2.8e+00	PCI/L	02/27/2012 16:11 CST
Beta	5.91e+00	3.4e+00	4.9e+00	PCI/L	02/27/2012 16:11 CST

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**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01734K	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	DUP
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 09:44	100.0	QB1A	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	4.04e+00	4.7e+00	4.1e+00	PCI/L	02/28/2012 09:44 CST
Beta	6.79e+00	3.3e+00	4.6e+00	PCI/L	02/28/2012 09:44 CST

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**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01735L	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 09:44	100.0	QB1B	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	6.69e-01	1.6e+00	1.3e+00	PCI/L	02/28/2012 09:44 CST
Beta	2.35e+00	1.3e+00	1.8e+00	PCI/L	02/28/2012 09:44 CST

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**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01736M	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 09:44	100.0	QB1C	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	8.58e-01	1.7e+00	1.4e+00	PCI/L	02/28/2012 09:44 CST
Beta	1.03e+00	1.2e+00	1.7e+00	PCI/L	02/28/2012 09:44 CST

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**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01737N	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 09:44	100.0	QB1D	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	4.86e-01	1.8e+00	1.5e+00	PCI/L	02/28/2012 09:44 CST
Beta	3.14e+00	1.4e+00	1.8e+00	PCI/L	02/28/2012 09:44 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
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**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01761N	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 09:44	100.0	QB2A	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	3.66e+00	2.4e+00	1.6e+00	PCI/L	02/28/2012 09:44 CST
Beta	2.31e+00	1.3e+00	1.8e+00	PCI/L	02/28/2012 09:44 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
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**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01762P	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 09:44	100.0	QB2B	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	5.86e-03	1.0e+00	9.5e-01	PCI/L	02/28/2012 09:44 CST
Beta	-4.14e-01	9.5e-01	1.6e+00	PCI/L	02/28/2012 09:44 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01762P	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	MS
Sample description:	N/A		
Comment:	Aqueous		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 11:45	100.0	QD2A	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	7.15e+01	1.5e+01	5.9e-01	PCI/L	02/28/2012 11:45 CST
Beta	6.14e+01	7.8e+00	4.0e+00	PCI/L	02/28/2012 11:45 CST



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**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01763Q	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 11:45	100.0	QD2B	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	9.83e-01	1.5e+00	1.1e+00	PCI/L	02/28/2012 11:45 CST
Beta	1.82e+00	1.0e+00	1.4e+00	PCI/L	02/28/2012 11:45 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
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**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01777X	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	Aqueous		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 11:36	100.0	GQ2A	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.13e-01	9.4e-01	8.2e-01	PCI/L	02/28/2012 11:36 CST
Beta	1.43e+00	1.1e+00	1.6e+00	PCI/L	02/28/2012 11:36 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01778Y	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 11:36	100.0	GQ2B	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.19e+01	5.4e+00	2.8e+00	PCI/L	02/28/2012 11:36 CST
Beta	1.22e+01	3.9e+00	5.1e+00	PCI/L	02/28/2012 11:36 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01779Z	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 11:36	100.0	GQ2C	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.71e+00	2.2e+00	1.7e+00	PCI/L	02/28/2012 11:36 CST
Beta	1.96e+00	1.6e+00	2.3e+00	PCI/L	02/28/2012 11:36 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01780R	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 11:36	100.0	GQ2D	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.36e+00	2.1e+00	1.5e+00	PCI/L	02/28/2012 11:36 CST
Beta	3.47e+00	1.8e+00	2.5e+00	PCI/L	02/28/2012 11:36 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01781T	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 09:48	100.0	G54A	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.42e+00	2.4e+00	1.8e+00	PCI/L	02/28/2012 09:48 CST
Beta	3.46e+00	1.6e+00	2.2e+00	PCI/L	02/28/2012 09:48 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01782U	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 09:48	100.0	G54B	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	6.26e-01	2.1e+00	1.7e+00	PCI/L	02/28/2012 09:48 CST
Beta	1.50e+00	1.4e+00	2.0e+00	PCI/L	02/28/2012 09:48 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01783V	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 09:48	100.0	G54C	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	2.95e-01	1.8e+00	1.6e+00	PCI/L	02/28/2012 09:48 CST
Beta	2.49e+00	1.3e+00	1.7e+00	PCI/L	02/28/2012 09:48 CST



**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01784W	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 09:48	100.0	G54D	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	7.65e-01	1.8e+00	1.4e+00	PCI/L	02/28/2012 09:48 CST
Beta	1.40e+00	1.2e+00	1.7e+00	PCI/L	02/28/2012 09:48 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01785X	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.500e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 09:56	100.0	GQ2A	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	3.90e-01	1.4e+00	1.1e+00	PCI/L	02/28/2012 09:56 CST
Beta	2.91e+00	1.3e+00	1.7e+00	PCI/L	02/28/2012 09:56 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	B2.01877A	QC batch #:	0008496P
Matrix:	WATER-DRINKING	Assay batch #:	0015744N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-01 L	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 09:56	100.0	GQ2B	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	2.98e+00	2.3e+00	1.5e+00	PCI/L	02/28/2012 09:56 CST
Beta	5.57e+00	1.9e+00	2.6e+00	PCI/L	02/28/2012 09:56 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	LCS-00631919B	QC batch #:	0008496P
Matrix:	N/A	Assay batch #:	0015744N
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	LCS
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 09:56	100.0	GQ2C	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.70e+01	3.7e+00	3.0e-01	PCI	02/28/2012 09:56 CST
Beta	1.58e+01	1.9e+00	1.1e+00	PCI	02/28/2012 09:56 CST

**U.S.ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG #1100248**

**SAMPLE ANALYSIS REPORT**

Sample #:	RBK-00631920U	QC batch #:	0008496P
Matrix:	N/A	Assay batch #:	0015744N
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	CHD
Ash/dry weight:	N/A	QC type:	RBK
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
02/28/2012 09:56	100.0	GQ2D	DJM

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Alpha	1.82e-01	3.6e-01	2.7e-01	PCI	02/28/2012 09:56 CST
Beta	-1.63e-01	2.7e-01	4.5e-01	PCI	02/28/2012 09:56 CST

**U.S. ENVIRONMENTAL PROTECTION AGENCY  
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY**

**SDG 1100248**

**QC BATCH SUMMARY**

QC batch #: 0008496P  
Preparation procedure: N/A  
Analysis procedure: NAREL GR-01

NAREL Sample #	QC Type	Yield (%)	$\pm 2 \sigma$ Uncertainty (%)	Analyst
B2.01731G	DUP	N/A		CHD
B2.01732H		N/A		CHD
B2.01733J		N/A		CHD
B2.01734K		N/A		CHD
B2.01734K		N/A		CHD
B2.01735L		N/A		CHD
B2.01736M		N/A		CHD
B2.01737N		N/A		CHD
B2.01761N		N/A		CHD
B2.01762P		N/A		CHD
B2.01762P	MS	N/A		CHD
B2.01763Q		N/A		CHD
B2.01777X		N/A		CHD
B2.01778Y		N/A		CHD
B2.01779Z		N/A		CHD
B2.01780R		N/A		CHD
B2.01781T		N/A		CHD
B2.01782U		N/A		CHD
B2.01783V		N/A		CHD
B2.01784W		N/A		CHD
B2.01785X	LCS	N/A		CHD
B2.01877A		N/A		CHD
LCS-00631919B *		N/A		CHD
RBK-00631920U *	RBK	N/A		CHD

\* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory  
QC Batch Report

QC Batch #: 0008496P

Analytical Method: NAREL GR-01

METHOD BLANKS (PCI)

Sample ID	Nuclide	Activity $\pm 2\sigma$	Prep Date	Flags
00631920U	ALPHA	$1.82e-01 \pm 3.6e-01$	2012-02-23	OK
00631920U	BETA	$-1.63e-01 \pm 2.7e-01$	2012-02-23	OK

LABORATORY DUPLICATES (PCI/L)

Sample ID	Nuclide	Original $\pm 2\sigma$	Duplicate $\pm 2\sigma$	RPD	Z
B2.01734K	ALPHA	$6.06e+00 \pm 4.4e+00$	$4.04e+00 \pm 4.7e+00$	40.08	-0.63 OK
B2.01734K	BETA	$5.91e+00 \pm 3.4e+00$	$6.79e+00 \pm 3.3e+00$	13.85	0.37 OK

MATRIX SPIKES (PCI/L)

Sample ID	Nuclide	Amt Added $\pm 2\sigma$	Native $\pm 2\sigma$	Measured $\pm 2\sigma$	%R	Z
B2.01762P	ALPHA	$6.96e+01 \pm 2.2\%$	$5.86e-03 \pm 1.0e+00$	$7.15e+01 \pm 1.5e+01$	102.67	0.25 OK
B2.01762P	BETA	$6.20e+01 \pm 2.2\%$	$-4.14e-01 \pm 9.5e-01$	$6.14e+01 \pm 7.8e+00$	99.72	-0.04 OK

LAB CONTROL SAMPLES (PCI)

Sample ID	Nuclide	Amt Added $\pm 2\sigma$	Measured $\pm 2\sigma$	%R	Z
00631919B	ALPHA	$1.74e+01 \pm 2.2\%$	$1.70e+01 \pm 3.7e+00$	97.70	-0.21 OK
00631919B	BETA	$1.55e+01 \pm 2.2\%$	$1.58e+01 \pm 1.9e+00$	101.96	0.31 OK

Analyst:

duBose, C H

29 Feb 2012

QA Officer:

Karl J. Miller

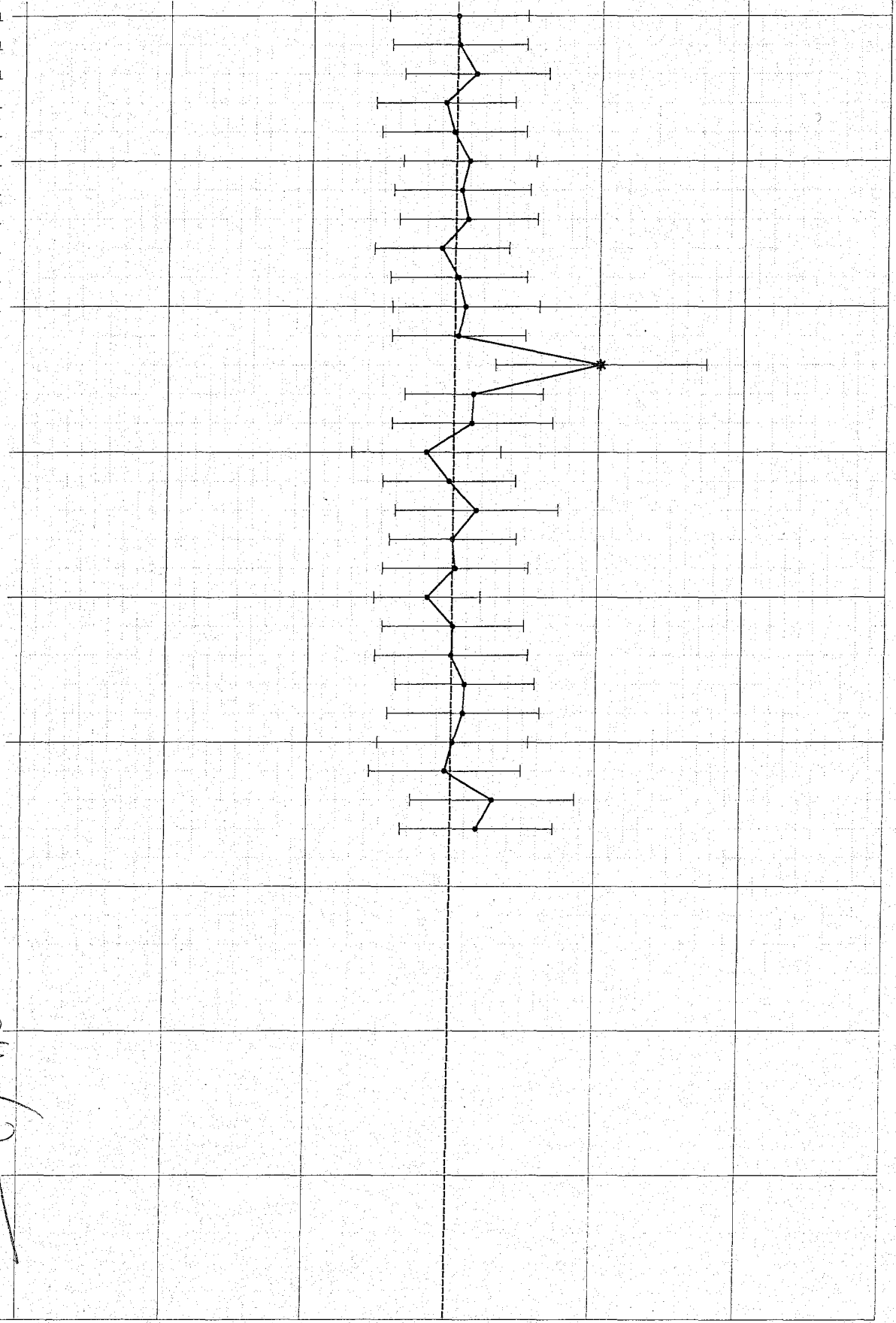
2/29/12

Method Blanks  
 Analyte: ALPHA  
 Method: NAREL GR-01  
 Analyst: duBoise, C H

Report: 1100248-ALPBET

32  
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 -1.0  
 -2.0  
 -3.0  
 Original

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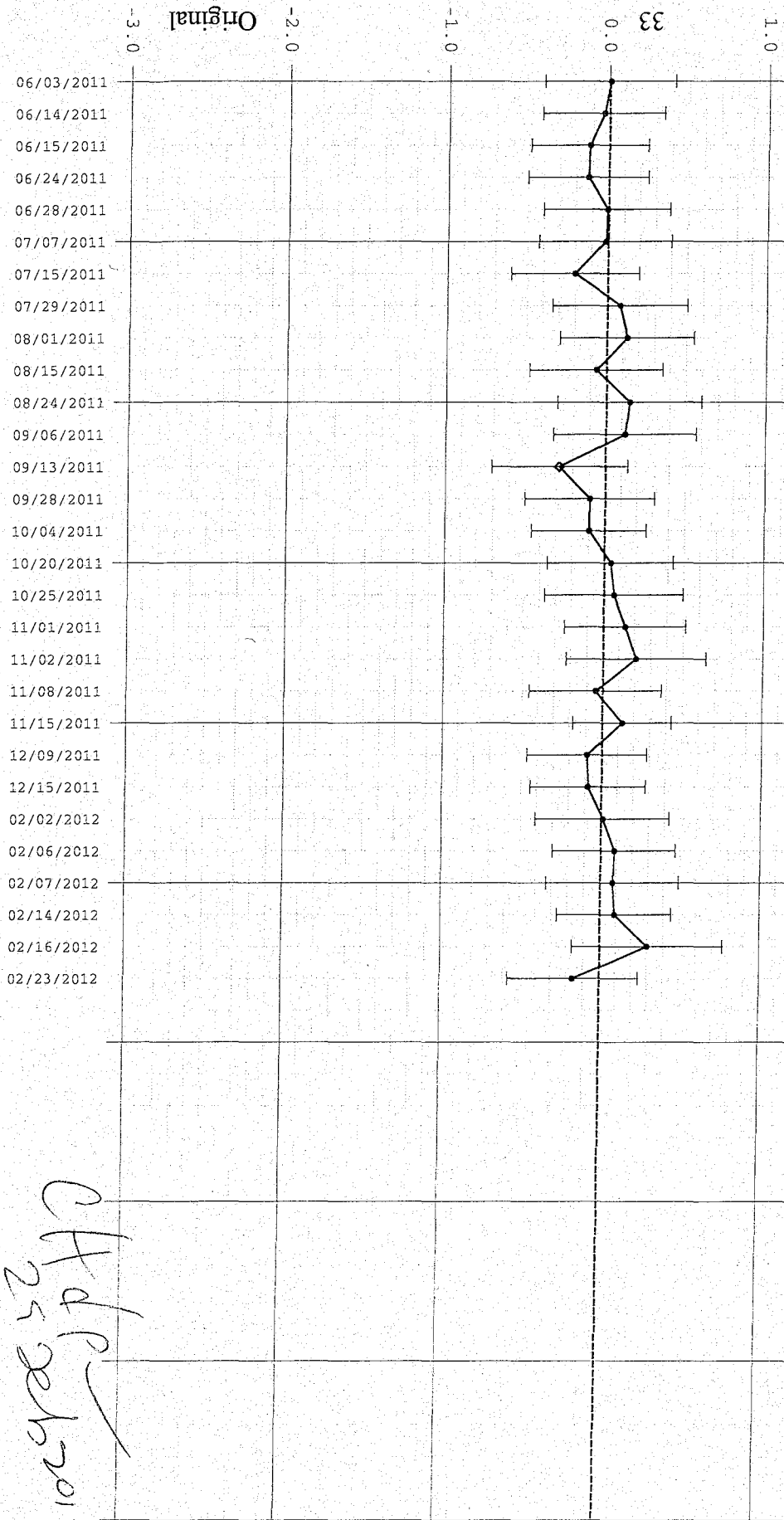


CHd  
 29 Feb 2012



Method Blanks  
 Analyte: BETA  
 Method: NAREL GR-01  
 Analyst: duBose, C H

Report: 1100248-ALPBET



CHdP  
 25 Feb 2012